

Remarks

Status of application

Claims 1-15, 17-40 and 42-70 were examined and stand finally rejected in view of prior art. Based on a discussion with the Examiner on February 6, 2009, Applicant has amended the claims to further clarify Applicant's invention. In view of the amendments made, the detailed discussion of the prior art references in Applicant's previously filed Appeal Brief and the following remarks, reexamination and reconsideration are respectfully requested.

Prior Art Rejections

Applicant appreciates the Examiner's courtesy in discussing Applicant's claims and the prior art references on February 6, 2009. Based on these discussions, Applicant has amended the claims to further clarify the distinctive features of Applicant's invention so as to clearly distinguish the claimed invention from the prior art of record.

As discussed in detail in Applicant's previously filed Appeal Brief (incorporated herein by reference), Applicant's parallel query processing solution provides for generating a plurality of different parallel plans for executing a given query, adjusting these plans to account for available resources, creating a schedule for execution of each such plan (including introducing additional parallelism when doing so will improve performance), and determining the best parallel plan amongst those plans in a manner that differs substantially from prior art solutions. In particular, Applicant's claimed invention provides for considering applicable resource constraints and adjusting the degree of parallelism of a plan based on such constraints. Applicant has amended its independent claims to bring these distinctive features to the forefront. For instance, Applicant's amended claim 1 includes the following claim limitations:

In a database system, a method for parallel optimization of a query, the method comprising:
generating a plurality of parallel plans for obtaining data requested by the query, the parallel plans including parallel operators for executing portions of the query in parallel;
adjusting parallel operators of each parallel plan based on maximum number of threads available for executing the query, wherein said maximum number of threads is user configurable;

creating a schedule for each parallel plan indicating a sequence for execution of operators of each parallel plan, wherein the schedule is created based upon dependencies among operators of each parallel plan and resources available for executing the query and includes identifying pipelines of operators in each parallel plan based upon dependencies among operators of each parallel plan, determining resource usage of each pipeline and splitting a particular pipeline having resource usage greater than resources available for executing the particular pipeline into a plurality of pipelines by adding operators for performing operations in parallel so that resource usage is distributed over the plurality of pipelines; determining execution cost of each parallel plan based on its schedule; and returning a result of a particular parallel plan having lowest execution cost for obtaining data requested by the query.

(Applicant's amended claim 1, emphasis added)

As illustrated above, Applicant's claimed invention provides for creating a schedule for each parallel plan based on resources available for executing the query and dependencies among operators of the plan. The schedule indicates a sequence of execution of plan operations. During the process of creating the schedule for a given plan, Applicant's invention determines whether the maximum resource usage of a pipeline of operators in the plan exceeds the maximum resources that are available (see e.g., Applicant's specification, paragraphs [155]-[156]; Fig. 12A at 1206). If the resource usage of the pipeline is greater than the available resources, operators are added to materialize the pipeline into a plurality of pipelines, each of which are within the capacity constraints (Applicant's specification, paragraph [156], Fig. 12A at 1207). These features of creating a schedule for execution of a query plan and adjusting the degree of parallelism of the plan based on available resources are not found in the prior art. Accordingly, Applicant respectfully believes that the claimed invention overcomes the rejection under Section 103 for the reasons set forth above and those set forth in Applicant's previously filed Appeal Brief.

Any dependent claims not explicitly discussed are believed to be allowable by virtue of dependency from Applicant's independent claims, as discussed in detail above and in Applicant's Appeal Brief.

Conclusion

In view of the foregoing remarks and the amendment to the claims, it is believed that all claims are now in condition for allowance. Hence, it is respectfully requested that the application be passed to issue at an early date.

If for any reason the Examiner feels that a telephone conference would in any way expedite prosecution of the subject application, the Examiner is invited to telephone the undersigned at 925 465 0361.

Respectfully submitted,

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/G. Mack Riddle/

G. Mack Riddle, Reg. No. 55,572
Attorney of Record

925 465-0361
925 465-8143 FAX